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A Multidimensional Approach to Product Advertisement in the Virtual Retail Environment[✧]

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Abstract-Internet presents a new business environment with great potential for marketers. Virtual retailing / e-shops, in particular, own the unique property of combining advertising practices and on-line sales functionality. In that context, the consumer buying process may be completed from start to end, from the need recognition stage, initiated by advertising, to the purchase decision stage, in an easy and integrated way. Thus, the role of interactive advertisement in this environment is crucial. In this paper, we examine the characteristics and potential of interactive advertisement in virtual retailing and propose a multidimensional approach to product advertisement in the virtual store, taking into account the consumer, retailer and supplier perspective.

I. INTRODUCTION: THE WEB AS AN ADVERTISING MEDIUM

Web as a virtual hypermedia environment incorporating interactivity with people and computers [1] represents a revolution in marketing. Evidence shows that the Internet and Electronic Commerce with all their new developments will redefine the meaning of the Marketing 4 P's [2].

The Web is rather like a cross between an electronic trade show and a community flea market. As an electronic trade show, it can be thought of as a giant international exhibition hall where potential buyers can enter at will and visit prospective sellers. As a flea market, it possesses the fundamental characteristics of openness, informality, and interactivity, a combination of community and a marketplace [3]. It also possesses the features of the marketspace, as defined by Rayport and Sviokla [4].

According to Berthon *et al.* [3], the Web site is something of a mix between direct selling (it can engage the visitor in a dialogue) and advertising (it can be designed to generate awareness, explain/demonstrate the product and provide information-without interactive involvement). In media terms, the Web is a lot more measurable than many other marketing communication efforts, with feedback being relatively quick, if not immediate. A study conducted by Leong *et al.* [5] regarding the position of the Web site vis-à-vis other media, locates the Web site in the intermediate position, distinguishing it from most of the other media, except Direct Mail. This study lends empirical support to Hoffman and Novak's [1] conceptual analysis of media and their characteristics (e.g. media's capability for audio, visual, or text content, interactivity, etc.), who placed the Web in an intermediate position, neither personal nor

impersonal, dynamic nor static [6].

The usual forms of advertising on the Web are:

- the development of a specific web site, usually called Internet Presence Site [7], for the promotion of a product or service;
- the sponsoring of a different web site for the indirect promotion of a product or service; the site sponsored is usually popular and attracts visitors from the desired target group;
- the advertisement of a product, service or web site via banners: a banner ad can basically be described as a piece of visual communication (either animated or still image) that is placed within a web site; its goal is to attract the web user long enough to compel a "click-through" [8];
- the reference of a web site, via links, by other, usually portal, sites, such as search-engines, online catalogues etc.

As indicated by the descriptions above, the last three forms of web advertising are indirect in the sense that they aim to guide traffic to a specific web site, where a product or service is advertised, sold, offered for free, etc.

In this paper we focus on the use of banners for advertising purposes, separating the term banner-ad, which refers to the *content* of a banner, from the term banner-space or banner-position, which refers to the *space on the screen* that a certain banner occupies. More specifically, we examine the use of banners for product advertisement within the virtual retail environment, or what is generally called an e-shop. Furthermore, we look into other possibilities for product advertisement in this environment and propose a multidimensional approach that takes into account the consumer, retailer and supplier perspective. Finally we discuss the system architecture and implementation of a virtual store that follows this approach.

In the following section we examine the characteristics of virtual retailing, or e-tailing, that distinguish it from other types of Web sites as well as from the traditional retail environment, especially as far as marketing and advertising practice is concerned. In section 3 we propose a certain scheme for product advertisement in the virtual retail environment, based on banners but also on the dynamic presentation of products in the e-shop. In section 4 we

[✧] This study was partly conducted within the context of the ACTIVE project (EP 27046), ESPRIT Programme (Framework IV), Commission of the European Union.

discuss the system architecture and other implementation issues associated with the proposed advertisement scheme and conclude with some thoughts regarding further development and research in this area.

II. PRODUCT ADVERTISEMENT IN THE VIRTUAL RETAIL ENVIRONMENT

Online markets are significantly different in a number of aspects from the structure of “classical” or physical markets. Their typology, client potential, price competition and client-producer interactions are considerably different from the same phenomena encountered in classical markets, where physical presence of the products and parties involved, distribution and transportation, advertisements and clearance of transactions play a role they do not yet have and to an extent never can achieve in online markets.

Hawkings *et al.* [9] argue that the convenience, depth and variety of information available on the Internet may well change the nature of consumer information search behaviour and evaluation of alternatives process in the future and transform generally the traditional model of the buying process. In addition, the Web changes the nature of communication between firms and customers and customers have considerable control over which messages they receive by visiting Web sites and being exposed to marketing communications[10].

Apart from these general considerations, which have led many researchers [3] [6] [11] talk of the need for a paradigm shift to pursue international marketing on the Internet, in this paper we focus on the specific characteristics of the virtual retail environment. This environment, through the possibility it offers to consumers for integrated transactions, has additional implications for marketers and advertisers. These include:

- *Interaction and response to a banner-ad can be directly translated into sales:* most of the banner-ads referring to products or services lead the user to a product- or service-specific site, usually called Internet Presence Site or IPS [7], where they may purchase the product/service or not. Contrary to that, banner-ads within an e-shop can take the user directly to that section of the e-shop, where the product can be added to the e-basket and bought immediately. A parallelism to that can be found in the traditional business environment between outdoor and in-store posters.
- *The e-shop environment can facilitate consumers through all the stages of the buying process:* according to the classical consumer buying process, as described in most marketing textbooks, consumers progress through the rational stages of problem/need recognition, information search, evaluation of alternatives, purchase decision and post-purchase behaviour [12], [13], [14]. The e-shop environment can offer an integrated service to consumers by helping them identify new needs, through advertisement, look for the required information, through advanced search facilities, evaluate different alternatives, through the availability of a variety of products, complete the buy,

through on-line basket and payment facilities, and finally offer after-sales support, via e-mail and customer service [15].

- *Consumer demographics information can be directly available, allowing for personalised service and one-on-one marketing communication:* In order to complete an on-line purchase, consumers have to provide their personal information, including demographics. In many e-shops, this step takes place up-front, when a consumer enters the shop for the first time. Thus, as of the first or the second visit, the consumer demographics information is readily available, allowing for personalised service and targeted advertising. This possibility can also be enhanced by the exploitation of information on past consumer buys and navigation habits [15].
- *Advertising effectiveness can be directly compared to sales effectiveness, based on on-line sales data:* In the traditional business environment, the effect of an advertisement campaign is usually read some months afterwards, when sales and market share data become available. In the e-shop environment, this information is readily available, allowing for immediate evaluation of a promotional action and, thus, for fast response.
- *Advertising of a product in the e-shop can be initiated by the e-shop owner, i.e. the virtual retailer, by the product supplier/manufacturer, or both:* Since advertising in the e-shop, in one or more of the forms described above, has the potential to increase product sales, this has benefits for both the retailer and the product supplier. Benefits may mean higher sales and store visits, profit increase, inventory decrease or elimination etc. This fact can lead either the virtual retailer or the product supplier or both in co-operation to promote products in one way or another.
- *An e-shop offers many possibilities for advertising, from banner-ads to special presentation in-store, discount offers, lotteries etc.:* When comparing an e-shop to other types of sites, which only offer banner space, one can argue that an e-shop offers many more possibilities for advertisement than the mere banner-ad [16]. These include: a) special presentation of a product in the products-section, i.e. in a more prominent position, as a picture with special animation effects etc.; b) discount offers, combined with the product's inclusion in the special-offers section of the e-shop or a weekly special-offers e-mail to customers; c) contests and lotteries, played on-line and contributing to building a brand's image and/or sales, etc.

The above comparison between a virtual retail site and other types of sites is summarised in Table I below.

TABLE I
COMPARISON BETWEEN VIRTUAL RETAIL AND OTHER TYPES OF SITES

Feature	Virtual Retail Site	Other Types of Sites
Click-through a banner add takes the user to	the product sales section, where the product can be purchased	another site, usually an IPS
Support is offered to consumers	Throughout the buying process	only at initial stages (need recognition, information search, evaluation of alternatives)
Consumer demographics and other information	is directly available as the user has to complete a purchase by registering	may not be available, if the user does not have to register with the site
Advertising effectiveness	can be associated to sales effectiveness	is only measured via click-through rate
Advertising of a product is financed / sponsored by	the product supplier or the virtual retailer	the product supplier only
The possibilities for advertising	are many, from banners to special product position "on-shelf", discount offers, lotteries etc.	are limited to banner-ads

The above list is not meant to be complete, but to indicate some of the points that imply changes to the advertising practice, both when comparing interactive advertisement with the more traditional forms of advertising, but also when comparing interactive advertisement between e-shops and other types of Web sites.

In this paper, we mainly focus on the last point raised above, indicating that within a virtual store there are many possibilities for product advertisement than the mere banner ad. More specifically, in addition to the banner ads, we consider the following possibilities:

- Product presentation "on-shelf"*, i.e. presentation on the corresponding product category web page: The assumption here is that the product occupying the most prominent position on the screen has higher possibility to be viewed and, thus, be purchased by the user. In other words, a product's position on the screen can be translated into an indirect way of advertisement. This refers to both the regular position of a product in the virtual store, but also to the product's appearance in the "special offers" section.
- Search results*: Following the same rationale as above, we assume that the product appearing first in the results list of a search operation has higher possibility to be viewed and, thus, be purchased by the user. A product's order in the search results list is, thus, considered as an additional way of indirect product advertisement.

In the following sections we propose a scheme that exploits all the ways explained above for product advertisement. This scheme takes into account the perspective and objectives of all involved players in the virtual environment, i.e. the virtual consumer, retailer and supplier, in order to determine the scheduling of banner-ads and the way products appear "on-shelf".

III. A MULTIDIMENSIONAL PRODUCT ADVERTISEMENT SCHEME

Before explaining how the proposed advertisement scheme works, let's first examine the objectives behind product advertisement for all the actors involved in the e-shop environment, i.e. the customer/ consumer, the virtual retailer, and the product suppliers. The reason behind this is to gain an understanding of the different needs that an advertisement scheme should ideally meet.

A **virtual consumer/customer** navigating through the "aisles" of the virtual store or performing a *search* operation is presented with lists of products and banner-ads representing certain products. These can be the same lists of products for all the consumers or can be personalised to match the specific consumer profile. The assumption here is that personalised banner ads and product lists are translated into higher product relevance and thus higher probability of purchase. In addition, this could mean ease of shopping, facilitation of the buying process and higher level of service, in general, as perceived by the consumer.

For the **virtual retailer/ e-tailer**, owner of the e-shop, product advertisement can be an important source of revenue. This revenue accrues from the following:

- banner booking*: this refers to the money paid by product suppliers for buying banner space for advertising purposes; given the special characteristics of an e-shop as described in the previous section, this can be a significant source of revenue;
- product sales*: advertised products may create needs and originate a purchase intention to consumers, leading to higher product sales and profit;
- customer satisfaction*: last but not least, personalised banner ads and product lists, combined with product discounts and other offers, mean satisfied and eventually loyal consumers.

Based on the above, a virtual retailer would like to use the virtual space of the e-shop for promoting those products: a) for which the supplier pays the most, if banner booking rates are not fixed; b) those that will render higher sales and profit; and c) those that will better satisfy each specific consumer needs.

The **product supplier** shares some considerations with the virtual retailer, but may also come into conflict with the e-shop owner, depending on the corresponding product properties. For a given product, the supplier would like to get the best banner and "shelf" position. That is the banner space that gets the higher number of user impressions [17] for the corresponding target group and the first position in the products list. Such a position will eventually increase the product's visibility among the target shoppers, build the product image and lead to higher product sales. The conflict between the virtual retailer and the product supplier may arise when the product to be advertised does not satisfy all of the retailer's criteria, i.e. the booking price, the product performance regarding sales and profit, and the product's matching to consumer needs. This means that for the same booking price, the virtual retailer may prefer one product

versus another, contrary to the supplier's wish.

From the discussion above, it appears that the process of

product advertisement is approached with different objectives by consumers and, mainly, the virtual retailer and product suppliers. This is graphically depicted in Fig. 1.

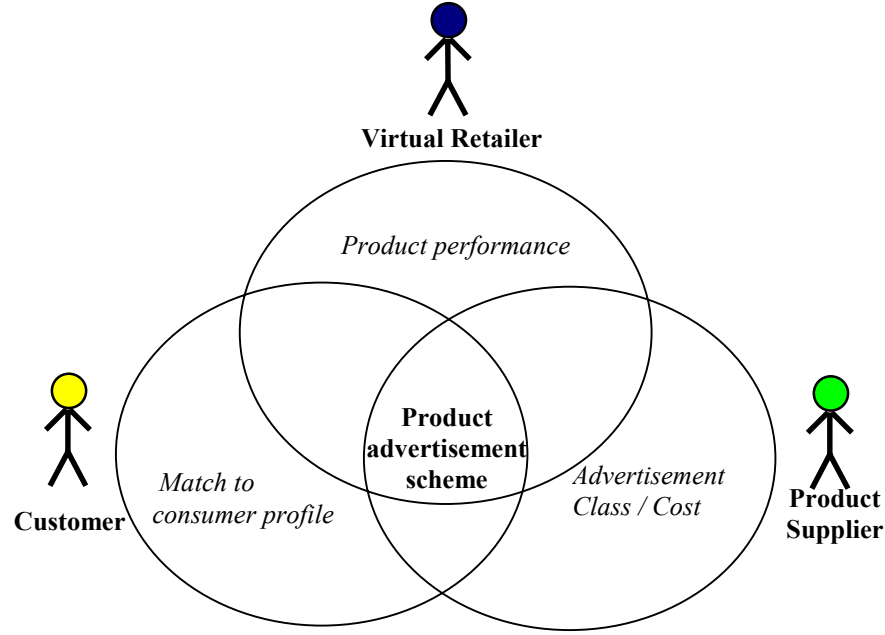


Fig. 1. Common and individual considerations for the virtual retailer, customer, and product supplier

In order to meet the objectives of all the players above, the proposed product advertisement scheme associates a priority with each product in the virtual store. The product priorities are different for each consumer, as they depend on the specific consumer profile. More specifically, a product's priority is determined by the following formula.

$$Pr = a \cdot C + b \cdot P + c \cdot M \quad (\text{Formula 1})$$

where:

- Pr = the calculated product priority
- C = matching factor between the specific consumer profile and the product's target group
- a = weighting factor for the matching between consumer profile and product target group
- P = parameter corresponding to the product performance in the virtual store; this can be based on product sales, turnover, profit, etc.
- b = weighting factor for product performance
- M = this corresponds to the fee the product supplier pays for getting a banner space and product position on the virtual shelf
- c = weighting factor for the fee paid by the supplier

If a , b and c are set to 1, then all three parameters have equal weight in the calculation of a product's priority. Values less than 1 indicate lower weight for the corresponding parameter. In addition, the following assumptions and rules apply to the three parameters:

- **Parameter C:** We assume that a product's target group is defined as a set of conditions referring to

demographic characteristics and corresponding values as well as past product purchases. For example, a product's target group may be defined as $TG = (\text{Sex} = \text{'Female'}; \text{Age} > \text{'20'}; \text{Past buys contains 'Detergent'})$. If, for a specific consumer, all the conditions are true, then parameter C gets its higher value. In all other cases, parameter C has a lower value.

- **Parameter P** may correspond to a single performance indicator, e.g. product sales, turnover or profit, for a certain time period, or may combine more than one performance measures, in a way similar to the one used for Formula 1. Weighting factors may again be used in order to depict the virtual retailer's strategy regarding sales volume, turnover and profit.
- **Parameter M:** For simplicity we assume that parameter M corresponds to different classes of cost regarding product advertisement. The higher the class, the higher the associated fees paid by the supplier and the value attributed to the parameter. This is further translated into higher expected service regarding banner space booking and product placement on the virtual shelf.

As product priorities depend on the consumer profile, these have to be recalculated each time a different consumer visits the e-shop. Obviously, for consumers of unknown identity and profile, priorities are solely based on product performance and cost class.

The product priorities calculated using Formula 1 are then used in the following fashion:

- i. *For selecting the appropriate banner-ad to show to each specific consumer.* As more than one suppliers/advertisers are expected to have requested the banner space of a certain web page, especially that of the home page or other general-purpose pages, the calculated product priorities may be used to resolve the conflict. More specifically, the banner-ad to show is the one corresponding to the highest product priority. If a sharing technique is used for banner space, e.g. time-sharing, then the top banner ads are selected first.
- ii. *For placing the products on the virtual shelf* or, in other words, presenting the products of a certain category on the screen. The product with the highest priority occupies the best “shelf” position, usually the first position in the products list, and so forth.
- iii. *For presenting the results of a search operation*, in a similar way to the one used for building the virtual shelf. Obviously, the products appearing on top of the search results list have higher probability to be noticed by the

user and are, thus, the products with the highest priority.

From the discussion above it appears that the multidimensionality of the proposed advertisement scheme is seen in two axes: a) the exploitation of several possibilities for on-line product advertisement in an integrated way; and b) the response to the objectives and needs of all the different players involved in the system, i.e. the consumer, the virtual retailer and the product suppliers.

In the following section we shortly describe the architecture of the system supporting this multidimensional approach to product advertisement in a virtual store. We then conclude with some remarks on the expected benefits of such an approach and on the opportunities for further research.

IV. SYSTEM ARCHITECTURE

The architecture of a virtual store that implements the proposed solution can be broken down into specific components. This is graphically presented in Fig. 2.

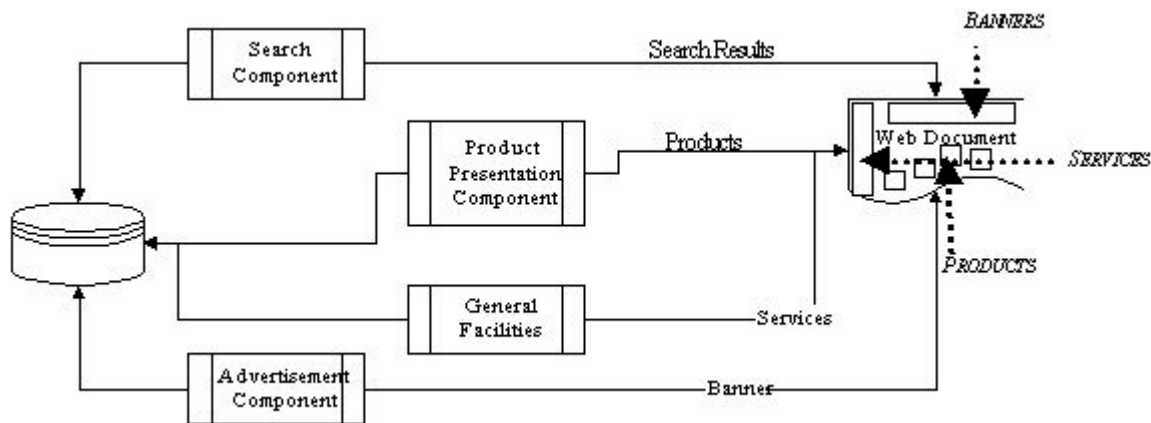


Fig. 2. Overview of the system architecture

The basic unit of the store site is the products web page, which consists of a banner space, the product presentation area and the general utilities area, containing search, basket, home page and other “buttons”. A user enters such a page after performing a search operation or after navigating through the hierarchical structure of product categories. The contents of each area are determined by the corresponding component, making use of Formula 1, as discussed in the previous section. Thus, for a specific consumer, the Products Presentation component will show the products in the order that best match the consumer profile, the Advertisement component will show a personalised banner-ad, and the Search component, if used, will show personalised search results based on the consumer profile and the rest of the criteria used.

The Web Server database stores, amongst other, the customer information, the product information and the banners. All the components communicate with the database in order to get and store information. In addition,

each component follows a specific operation logic. For the Advertisement component this logic is described in Fig. 3.

When a user visits the store, his/her profile information becomes available through the login name. We assume here that this information is provided by the user the first time he/she has registered with the store, either on entry or at check-out. The profile information is then used by the Advertisement component in order to determine and prioritise the banners to be shown on the specific page. For the first time, this is the welcome page. This function is performed each time the user visits a new page. The prioritisation of banners is based on Formula 1 presented at the previous section. The rest of the information used in the formula, i.e. banner booking category and corresponding product performance, is retrieved independently by the database. The Product Presentation component operates in a similar way in order to present the products in the right order.

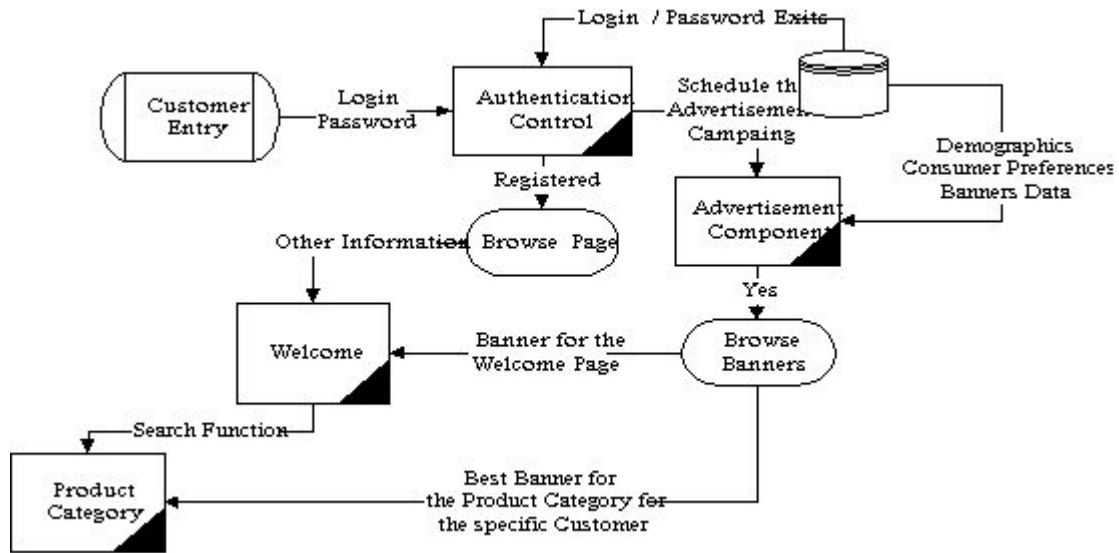


Fig. 3. Operation logic of the Advertisement component

Such use of the advertisement component requires small storage capacity, because the advertisement selection takes place after the authentication control for every customer entry. This is also very flexible, in terms of monitoring customer behaviour. The only problem is the synchronisation between the Advertisement Component and the Product Presentation Component. These two components respectively enrich the Web Pages with banners and products. At this point two cases are identified:

- Product Category and Banner are relative, which means that the banner describes a specific product inside the selected category
- Product Category and Banner are not relative.

The second case is simple because each component is acting by itself. The first case is more tricky and, thus, requires the use of Threads technique in order to avoid the deadlock problem.

V. CONCLUSIONS AND FURTHER RESEARCH

The key benefit of the approach described in this paper is that it accommodates the needs of all players involved in the system, so that everyone feels part of a win-win situation:

- The e-tailer gains by:
 - selling integrated advertisement services to suppliers in equal terms for all
 - promoting the products that are expected to render higher gains, either in profit or sales
 - offering better customer service and building store image and customer loyalty

- The e-supplier gains by:
 - having the possibility to apply well-defined targeted advertisement
 - covering all aspects of on-line product advertisement in an integrated way and at a cost that would otherwise serve only banner booking
 - getting better opportunities for product promotion, especially if he is a small supplier with products addressed to a niche market.
- The e-consumer gains by:
 - seeing relevant products and advertisements according to his/her demographic profile and past buys
 - doing faster and easier shopping

In addition, the approach proposed in this paper is a first attempt to take into account Category Management considerations in a virtual retail environment. In the physical retail environment, Category Management, as part of the Efficient Consumer Response strategy [18], plays a key role in improving the efficiency of the value chain at the consumer-end. Key considerations include the efficiency of product assortment in-store, the efficiency of pricing and promotions, the efficiency of space management etc. The main objective behind this is the satisfaction of the end-consumer, via a win-win retail-supplier relationship [19].

As digital technology and electronic commerce evolve, marketers need to continuously enhance the value of their digital offerings to consumers. Thus, the principles of Efficient Consumer Response will most probably find their position in this environment as well, and guide system

design options. Obviously, there are many functional areas and processes of the e-shop environment that need to be examined under this perspective. In-store promotions, shelf structure and banner booking, in particular, as described in this paper, is just a small example. Other examples include: definition of the ideal product assortment for each customer/ group of customers, personalised hierarchical category structure, evaluation of promotional campaigns, personalised price strategy, etc. The objective here is not to make a detailed list of all of them, but to show that there is ample room for development and research in this area.

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